

Resource Valuation

Tool for Improving Protected Areas Management in Indonesia

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Discussion Paper

Resource Valuation: *A Tool for Improving Protected Areas Management In Indonesia*

**A Summary Introduction to the Concept and Techniques
with Examples from Indonesia**

The Natural Resources Management/EPIQ Program's Protected Areas Management team works with BAPPENAS and the Directorate-General for Nature Protection and Conservation (PKA) of the Department of Forestry and Estate Crops to strengthen protected areas management in Indonesia. Work includes promoting partnerships among the private sector, government agencies, NGOs, and local communities; raising conservation awareness; improving conservation financing; and building institutional and human resources capacity.

For further information, please contact:
Elfian Effendi, NRM/ EPIQ Conservation Finance Specialist
The Natural Resources Management/EPIQ Program component Protected Areas Management
Office at: Manggala Wanabakti, Block IV, 6th Floor, Room 624C,
Jl. Jend. Gatot Subroto, Jakarta 10270,
tel: (62-21) 571-1194; fax: (62-21) 574-7066; email: fian@nrm.or.id

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GLOSSARY

CIFOR	Center for International Forestry Research
EEPSEA	Economy and Environment for Southeast Asia
HPH	Hak Pengusahaan Hutan (Concession of Production Forest)
NRMP	Natural Resource Management Project
PKA	Perlindungan dan Konservasi Alam (Directorate of Nature Protection and Conservation)
NPV	Net Present Value
NGO	Non-Governmental Organization
USAID	United States Agency for International Development
WWF	World Wide Fund For Nature

Introduction

Indonesia's protected areas system harbors some of the most important tropical forest and biodiversity resources in the world. These natural resources provide benefits at local, national, and global scales. However, these resources are under great pressure from local population growth and national demand to generate foreign exchange. To improve the management of these resources, Indonesian policymakers can use resource valuation methodologies to gain an accurate assessment of the true economic value of protected areas.

The term *resource valuation*, as used in this document, refers to the set of economic techniques to ascribe a numeric, monetary value to the goods and services provided by protected areas. Such an understanding allows policymakers to determine the most effective and efficient use of terrestrial or marine areas and to equitably distribute the costs and benefits of conservation. Moreover, as resource valuation can demonstrate the link between conservation and regional economic development, it can serve as an important mechanism to raise community awareness and appreciation for protected areas.

The USAID Natural Resources Management Program supports the Directorate-General of Nature Protection and Conservation (PKA) and others in Indonesia's conservation community in the promotion of decentralized, democratized, and multi-stakeholder natural resources management. The purpose of this paper is to provide PKA staff and others with a summary introduction to the concept and techniques of resource valuation with examples from Indonesia.

This paper argues that resource valuation will better illuminate the link between protected areas management and development in Indonesia. The paper reviews efforts at using this tool in Indonesia and elsewhere, thus far, and then provides details on the actual economic methodologies used to conduct a resource valuation. This discussion on specific methodologies attempts to provide an Indonesian context showing where and when different techniques are appropriate. The paper then examines practical issues for the policymaker wishing to implement a resource valuation, and concludes with recommendations for the Government of Indonesia and the PKA on the institutionalized use of this tool.

Protected Areas Management and Economic Value

A common misconception in Indonesia is that protected areas represent natural resources lost to development. The belief is that once the government gazettes an area and limits human activity, few if any benefits accrue to the local community or nation. Appreciating the link between protected areas and local or national development requires broadening the understanding from strictly financial benefits and costs to non-monetized *economic* benefits and costs.

The benefits of protected areas consist of *direct use values* that are captured by traditional accounting methods, but the benefits also include *indirect use, future use, and non-use values* (Table 1). *Direct use values* include food, forest or marine products, and recreation. These are easily measurable as benefits gained (e.g., park entry fees paid by tourists, collected timber and non-timber forest products) and opportunity costs (e.g., foregone mining rights). However, there are more benefits that traditional accounting methods do not capture. *Indirect use values* consist of the functional benefits that sustained ecological processes provide. For example, undisturbed hillside forests provide flood control protection, while coastal mangroves maintain fisheries. Such processes also provide global benefits, as tropical forests absorb carbon and mitigate climate change. Market prices do a poor job of reflecting indirect use values in the prices of products. Nonetheless, indirect use values show a real link between protected areas and local economic development.

Option values include current services saved for consumption at a later date (e.g., a forest set aside for future harvesting) and speculative products such as genetic resources prospected from tropical forests. Typically, undiscovered products have no market value today. *Non-use values* consist of the existence value people ascribe to protected areas – the spiritual, aesthetic, and cultural benefits they provide – and the bequest value people gain from knowing such areas will remain intact for future generations. These values, too, are poorly reflected by market prices.

Table 1:
Total Economic Value Derived from Terrestrial and Marine Protected Areas

Total Economic Value				
Use Values			Non-Use Values	
Direct Use	Indirect Use	Option Value	Bequest Value	Existence Value
<i>Directly consumable outputs</i>	<i>Functional benefits</i>	<i>Future direct and indirect values</i>	<i>Use and non-use value of environmental legacy</i>	<i>Value from knowledge of continued existence</i>
Food, biomass; recreation	Flood control; storm protection; nutrient cycles; fisheries; global life support; education and research; archaeological study; human health	Biodiversity; genetic resources; species protection; ecosystem diversity; evolutionary processes	Habitat conservation; prevention of irreversible change	Habitat and species conservation; cultural and social cohesion

Source: Adapted after Pearce and Moran, 1994; Dixon and Sherman, 1990; and, Hoagland et. al., 1995)

Dixon et. al. (1996) also argue that the use values of protected areas induce additional, albeit small, net benefits through a multiplier effect. For example, the money paid by a visitor at an ecotourism lodge generates additional spending throughout the region, as local food retailers and growers engage in productive activities to supply food to the lodge. However, the lodge may also induce costs, such as increased wastewater outflow, that lower the net benefit substantially. Thus, we must examine the economic costs of protected areas as well.

The establishment and management of protected areas entail significant direct and opportunity costs. The direct costs entail all those reflected in the PKA budget: employee salaries, infrastructure (e.g., park offices and roads), equipment, maintenance, travel, administration, research, community outreach, buffer zone community development, boundary demarcation, and monitoring and enforcement (see table 2). For instance, management cost of national park per hectare allocated by the Government of Indonesia during 1994/95-1998/99 is only about US \$0.56. It does not reflect the actual total investments in national park management, because this figure does not include investments by other non-governmental organizations and donors in support of national park management.

Table 2:
Management Cost of Protected Areas in Indonesia, 1994/95 – 1998/99
(in million rupiah)

	1994/1995	1995/1996	1996/1997	1997/1998	1998/1999	Total
The overall ministry budget	488,508	655,972	657,109	636,590	564,896	3,003,075
PKA Component	52,904	57,682	62,159	78,915	126,888	378,548
Percentage	10.83	8.79	9.46	12.40	22.46	12.61

Source: Directorate General of Nature Protection and Conservation's the Ministry of Forestry and Estate Crops, 1998.

There are also large opportunity costs of forgoing use of natural resources. Typically, these include the lost rights to timber, non-timber forest products, mining, agricultural land, human settlement, industrial land, waste disposal, fisheries, shipping, treasure salvage, and tourism.

Normally, policymakers only have data on a protected area's direct benefits, such as revenue from gate fees, the direct costs of park administration, and the large opportunity costs of not exploiting resources. The methods used to conduct a resource valuation go beyond traditional accounting methods to help policymakers understand the many uncounted benefits and full economic value of a protected area.

Literature Review of Resource Valuations in Indonesia

Resource valuations are a valid and reliable tool on which to base natural resource management decisions. Indonesian universities, NGOs, international donors and research institutions have carried out resource valuation studies at different places using different techniques. The results of this work suggest that policymakers significantly undervalue protected areas when making land use decisions. Below we review the work accomplished thus far. In the following section, we discuss in detail the specific economic methods used in resource valuations.

Darusman (1993) studied the indirect benefits of watershed protection derived from Gunung Gede Pangrango National Park in West Java. Based on hydrological modeling and an assessment of local people's willingness-to-pay for the continued flow of water for drinking, sanitation, and agriculture, he estimated the indirect use value of the park at Rp. 280 million per hectare, or approximately \$110,000 per hectare in constant terms.

A study of Bunaken Marine National Park in North Sulawesi valued the overall direct benefits derived by fishermen working in the park buffer zone (NRMP Report No. 62, 1996). Artisanal and small-scale commercial fishermen rely on the protected coral reefs of Bunaken as a breeding ground and hatchery for fish. Approximately 2,100 full-time and 430 part-time fishermen reside in the park buffer zone. The total economic value of the fishery to buffer zone residents is estimated at \$3.8 million per year for full-time fishermen and \$330,000 for part-time fishermen. The value of the Bunaken fishery may be as much as \$6.4 million for the entire province.

A WWF/CIFOR-funded study of the Leuser Ecosystem, extending over 1.8 million-hectare, found that the annual market value of water for irrigation, industries, and domestic uses that is in part derived from the Leuser Ecosystem amounts to \$34.3 million (Elfian, 1998).

In 1996, the USAID Natural Resources Management Project sponsored a study to determine the non-market value of Bukit Baka-Bukit Raya National Park in West and Central Kalimantan. The study team surveyed 800 households to assess their willingness-to-pay for the continued preservation of the forest. Based on a response of Rp. 11,500 per year per household, the team extrapolated the value of the forest to both provinces to be Rp. 10 billion per year (NRMP Report No. 64, 1996).

The Asian Development Bank-funded research carried out by Duke University in conjunction with the Biodiversity Conservation Project in Florest and Siberut assessed the willingness-to-pay of tourists for the direct recreation value of visiting Siberut island off the west coast of Sumatra. The researchers found that tourists were willing to pay a \$23 fee to support conservation of the environmental and traditional culture of the island (Kramer, et al., 1997). The project also assessed the watershed protection benefits provided by protected forest in Ruteng, Flores. The researchers found that the marginal benefit of watershed protection was \$35 per household per year (Kramer, et al., 1997).

Cannon (1998) carried out economic valuation of natural resources in the Togeian Islands. The study found that net present value of ecotourism reaches Rp 5.3 billion over 25 years at 10% discount rate (low value scenario). Using production-based approach, net present value of traditional fisheries valued at Rp 196 billion and Rp. 36.3 billion for high and low scenario values respectively. Cannon also found that net present value of forestry amounts to Rp. 4.1 billion over 25 years at a 10% discount rate. This

study recommends the rejection of logging as a development option because it leads to reduction in tourism and fisheries profits.

Sawyer (1992) did economic valuation of Taka Bone Rate National Park looking at the economic value of the park with and without management scenarios. Using a 5 % discount rate and a project life of 20 years, the economic value of fisheries of TBR has a Net Present Value (NPV) of Rp. 103.43 billion. According to the “without management” option, assuming fish catch decreases over time, the economic value of the fishery is substantially decreased. For example, a 5% decrease in fish catch per year assuming a 5% discount rate represents a change of Rp. 55 billion. According to the “with management” option, assuming a gross increase in fish catch of 5% per year, the value of the fishery is Rp. 222.95 billion with a 5% discount rate.

Resource valuations in other countries also serve as important models for future efforts in Indonesia. For example, in Munasinghe’s (1993) study of Mantadia National Park in Madagascar, he determined the net economic benefit of the park while also showing to whom costs and benefits accrued. He showed that while net benefits are positive, the majority of costs are borne by local residents in terms of foregone use of the park’s natural resources. Total benefits to both foreign visitors and local residents are approximately \$3.4 million per year. Costs of \$673,000 per year, however, accrue only to local residents. The study suggests the Government of Madagascar should ensure that park-generated tourist revenue is equitably shared with those residents absorbing significant costs.

Techniques for Conducting a Resource Valuation in Indonesia

The goal of the PKA is to promote the well-being of the Indonesian environment for the benefit of all Indonesian people. Achieving this goal means maximizing total economic *value* of protected areas, not just total financial *revenue*. An undue focus on revenue maximization may meet short-term needs for economic growth, but rarely is such a strategy sustainable. For sustainable natural resources management, the policymaker must rely on a variety of economic techniques to determine total value, starting with a straightforward assessment of revenue, but then moving to the more difficult tasks of resource valuation. With complete information, the policymaker can then prioritize areas for conservation and determine an equitable sharing of costs.

a. Assessing Revenue

Indonesia's protected areas generate a significant revenue stream from visitor fees, fees and royalties paid by timber and mining concessions, and the fees paid by harvesters of non-timber forest products. Such data is relatively accessible to the policymaker, but it is only a first approximation of the value of protected areas. For example, Table 3 below presents the revenue from entrance fees to ten national parks. Over five years, these 10 parks, encompassing some 3.6 million hectares, generated Rp. 3 billion in visitor fees. Seemingly, this is a small amount of money for such a large amount of land, but the true value is much greater. Protected areas also can generate revenue for local and national level through fee from ecotourism licensing and contribution from ecotourism activities operating within protected areas. During 1994/95-1997/98, revenue gained from the issuance of ecotourism licensing only amounts to Rp. 395 million.

Table 3:
Revenue from Entrance Ticket Fees in Indonesian National Parks
(in thousand rupiah)

National Park	Fiscal Year					Total
	1993/94	1994/95	1995/96	1996/97	1997/98	
Gunung Leuser	15,592	39,127	43,811	26,142	37,616	162,287
Kerinci Seblat	1,327	2,123	426	1,889	0	5,766
Ujung Kulon	15,060	11,555	9,611	14,094	14,643	64,953
Gn. Gede Pangrango	67,003	52,535	72,496	56,046	68,374	316,454
Baluran	35,029	16,733	29,248	27,553	22,873	131,435
Bromo Tengger	0	327,015	246,299	339,753	348,172	1,261,239
Bali Barat	67,538	66,816	67,100	82,600	70,300	354,354
Komodo	68,636	55,299	68,228	74,504	400,450	667,117
Tanjung Puting	10,602	14,567	17,860	17,240	14,883	75,153
Bukit Barisan Selatan	0	0	0	187	0	187
Total	280,786	585,770	555,080	640,009	977,302	3,038,947

Source: Directorate General of Nature Protection and Conservation, 1998

b. Assessing Value Beyond Revenue

The practical challenge in conducting resource valuations is the derivation of credible estimates of the value of biological resources in contexts where there are either no apparent markets or very imperfect markets (Brown et al., 1993). Some benefits derived from protected areas relatively concrete, such as watershed protection benefits;

however, others, such as existence value, are quite abstract. Dixon and Sherman (1990) note that protected areas have five characteristics which make valuation difficult:

- **Nonrivalry:** if there is no competition in the consumption of a protected area's services, the market price for such services will be inaccurate.
- **Nonexcludability:** open access resources will often have a market price of close to zero, even when the actual value is quite large.
- **Off-site effects:** reflecting the above two characteristics, the benefits of protected areas often flow to other communities, provinces, or countries, skewing the market price of these services well below the actual value.
- **Uncertainty:** market failure occurs because of incomplete or incorrect information on the scarcity of resources within a protected area.
- **Irreversibility:** if a protected area is destroyed, it may take centuries to return the area to its original state. In effect, the supply of environmental goods and services is very inelastic, making the actual value difficult to determine.

Nonetheless, economists have developed many tested and accepted techniques for assessing value that are appropriate for different circumstances. These techniques, and their application in Indonesia, are discussed below.

b.1. Market-Based Techniques

These techniques use actual market prices as a surrogate for the value of environmental goods and services. For example, local residents who gather firewood from a protected area may not actually pay any money to do so. A simple way to determine the value of that firewood is to compare it to a similar product for sale in local markets. The principles of this method are the basis for the determining the marginal value of protected areas for production and for human health.

Marginal effect on production. Protected areas ensure the maintenance of productive natural resource-based industries. If the protected area is harmed, production goes down. The market price of the lost production reflects the economic value of the protected area. For example Cannon (1999) estimated the economic impact of logging on traditional fisheries in the Togean Islands of Central Sulawesi. Logging in the islands occurs at the rate of 750 hectares per

year, leading to increased sedimentation on approximately 3,750 meters of coastline and fishery-supporting reefs. This leads to a 50 percent decrease in fish catch from these reefs, or a loss of Rp. 2.2 million per year.

Marginal effect on health. Protected areas provide clean air and water for human consumption. When these services are lost, human production drops, as reflected in lost wages. For example, downwind smoke from the 1997 forest fires in Sumatra and Kalimantan made some 12 million people ill in Indonesia, Singapore, and Malaysia. Approximately 2.5 million working days were lost during that period, or a value of US \$924 million (EEPSEA and WWF, 1998).

b.2. Cost-Based Techniques

These techniques value protected areas in terms of their opportunity costs (i.e., foregone benefits) and in terms of the costs which would be incurred to maintain naturally occurring goods and services.

Opportunity cost. The marginal economic value of a protected area appears in relation to the net present value (NPV) of an alternative land use. For example, we can approximate the NPV of a natural forest from quantifiable benefits and associated management costs. An alternative land use might be a rubber plantation, with its own NPV. A study in Nigeria followed just such an example, finding the NPV of the natural forest to be higher. The difference in NPVs reflects the value of the forest (Dimowo, Anthonio, and Coates, 1993).

Preventive costs. A protected area can prevent physical harm to local communities. For example, intact hillside forests mitigate downstream flooding. Should logging be allowed, communities or the government would need to build levies and dikes to handle increased run-off and prevent floods. The cost of these new structures reflects the value of the forest.

Replacement costs. Protected areas maintain land quality and nutrient cycles. Deforestation increases soil erosion and the loss of nutrients. These nutrients can be replaced via fertilizers; the cost of the fertilizer reflects the value of the conserved watershed. A study of the Magat watershed in the Philippines

assessed the value of maintained nitrogen, phosphorous, and potassium at between \$50 - \$127 per hectare (Barbier, 1995).

b.3. Travel Cost Technique

This technique determines the recreation value of a protected area by the willingness-to-pay of visitors. It looks beyond solely the entry price to a park to also consider the costs of traveling to the site and visitors' forgone earnings or opportunity cost of time spent. This technique shows that visitors are often willing to pay far more than actual park fees. The difference between these amounts is the consumer surplus, from which economists can create a demand curve that shows the total recreation value of the park. This technique was used to estimate the recreation value of Bunaken National Park in North Sulawesi. The study found that non-local tourists are willing to pay a total of \$328 per person to visit the park. With 12,800 visitors in 1996, the aggregate recreation value of the park was \$4.2 million (NMRP Report No. 66, 1996).

b.4. Contingent Valuation Technique

This technique is used when no relevant market exists for environmental goods and services. This technique constructs market variables by directly questioning individuals about their willingness-to-pay for such goods and services, and about their willingness-to-accept monetary compensation should they be deprived of the same goods and services. Econometric techniques are used to generate a demand curve that shows an average valuation per respondent. An accurate contingent valuation study requires careful development of survey questions, implementation, and sample selection in order to obtain accurate results. For example, in the Bukit Baka-Bukit Raya survey referred to above, 800 respondents were asked how much they are willing to pay for preserving the forest in the Bukit Baka Bukit Raya area along the broader of Central Kalimantan and West Kalimantan. The study showed that people are willing to pay approximately Rp. 11,500 per household for the services provided by the park (NRMP Report No. 64, 1996).

Practical Issues in the Implementation of a Resource Valuation Study

This paper argues for a more systematic use of resource valuation techniques throughout Indonesia's protected areas to better inform government leaders making land use decisions. However, the PKA manager as well as other relevant government agencies such as Bappeda seeking to implement such a study have legitimate questions regarding material and salary costs, quantity and qualifications of human resources, and time required to complete the study. While the answers to these questions depend on many factors, the PKA are fully capable of implementing resource valuations. Each resource valuation will require different resources, but general issues for the PKA to consider are as follows:

- **Location and size of study area.** This will affect travel costs, study duration, and number of required field enumerators (i.e., surveyors)
- **Population size and diversity of economic activities in and around the protected area.** Larger populations and a more diverse set of economic activities may demand the use of more valuation techniques. On the other hand, with a large local population, markets may more accurately approximate environmental goods and services, allowing for the use of simpler market-based techniques.
- **Pre-existing data.** Some protected areas will already have detailed data on hydrological modeling and monitoring, erosion, sedimentation, logging, collection of non-timber forest products, fish catch, and park visitors, to name a few, lessening the requirements to conduct a resource valuation.
- **Valuation technique used.** In general market-based and cost-based techniques are usually simpler to implement than travel cost and contingent valuation studies.
- **Respondent sample size.** A larger sample size will improve accuracy, but necessarily demand more time and labor.
- **Human resource requirements.** Typically, a valuation will require a combination of economists, enumerators for data collection, data managers, and data analysts and statisticians.
- **Goals for reporting and dissemination of study results.** If study results are to be used to settle land use disputes, achieve an equitable distribution of benefits and costs (e.g., raising fees for park visitors) or advocate for an important policy change (e.g., the prohibition of logging in park buffer zones), the study leader must consider

the costs of an information dissemination strategy. Otherwise, the study may become an academic exercise rather than a policy tool.

Numerous opportunities exist for the PKA to form synergies with other government organizations, universities, NGOs, and international donors to conduct a study. Other government agencies will often have data on the value of timber, minerals, agricultural output, and drinking and sanitation water; universities have a mandate to support environmental and economic research; the Indonesian labor pool of economists and statisticians is deep; university students are readily available to serve as enumerators; international donors can provide expert advice on survey design and interpretation as well as funds for the training of economists overseas; and, it is often within NGO mandates to disseminate information to promote public awareness.

The private sector can play its role in the implementation of resource valuation study through providing funding and permitting researchers to do valuation study in areas where private industries are operating such as areas for logging. The private sector can take advantage of the results of the study in making better decisions, addressing ecological, social and economic interests for the longer period.

Recommendations for the Directorate General of Nature Protection and Conservation of the Ministry of Forestry and Estate Crops and Relevant Government Agencies

- Produce a simple guidance book on how to implement different resource valuation techniques. This should enable park managers and regional authorities to budget and plan for valuations in protected areas under their purview.
- Implement model resource valuations in one to two protected areas in different provinces with the active involvement of multiple stakeholders.
- Promote information on case studies showing how resource valuations allow for better decision making regarding land use, protected areas, and the allocation of benefits and costs.
- Facilitate regular fora with multiple stakeholders at local, regional, provincial, and national levels to discuss the role of protected areas in regional economic development. The results of resource valuation studies are crucial to such discussions.
- Promote a core of “Protected Areas Valuation” experts at regional and national levels. This core of experts will not form a new organization within the PKA. Rather, they can be a team of experts available to the Direktorat Konservasi Kawasan (Directorate of Conservation Areas). These staff and the Directorate can collaborate with the Research and Development Board of the Ministry of Forestry and Estate Crops and other government and non-government agencies.

Bibliography

- Barbier, EB. 1995. *The Economics of Soil Erosion: Theory, Methodology, and Examples*. Paper based on a presentation to the Fifth Biannual Workshop on Economy and Environment in Southeast Asia. Singapore.
- Brown, Katrina et al. 1993. *Economics and the Conservation of Global Biological Biodiversity*. UNDP, UNEP and World Bank.
- Canon, Jim. 1999. *Participatory Economic Valuation of Natural Resources in the Togean Islands*. Jakarta: NRM/ EPIQ Program.
- Darusman, D. 1993. *Nilai Ekonomi Air untuk Pertanian dan Rumah Tangga: Studi Kasus di Sekitar Taman Nasional Gunung Gede Pangrango (Economic Value of Water for Agriculture and Household: Case study in Mt. Pangrango National Park)*. Paper presented at National Symposium on Water Problems, 28-29 July 1993, at Institute of Technology Bandung.
- Duerr, A. William. 1993. *Introduction to Forest Resource Economics*. USA: McGrawHill International Editions.
- Dimono, Anthonio, and Coates. 1993. *Cost Benefit Analysis of Land Use Alternatives in Okomu Forest Reserve*. United Kingdom – WWF.
- Dixon, John et al. 1994. *Economic Analysis of Environmental Impacts*. London: Earthscan Publication.
- Dixon et al. 1996. *Economic Assessment of Protected Areas: Guidelines for Their Assessment*. IUCN and Australian Nature Conservation Agency.
- Dixon, John and Paul Sherman. 1990. *Economics of Protected Areas: A New Look at Benefits and Costs*. East-West Center.
- EEPSEA/WWF. 1998. *The Indonesian Fires and Haze of 1997: The Economic Toll*. Singapore and Jakarta.
- Elfian. 1997. *An Initial Resource Valuation of the Leuser Ecosystem*. Jakarta: CIFOR funded study.
- Hoagland et al. 1995. *A Methodological Review of Net Benefit Evaluation for Marine Reserves*. World Bank.
- Kramer, et al. 1997. *Last Stand: Protected Areas and The Defence of Tropical Biodiversity*. Oxford University Press, Inc.

- Munasinghe, M. 1993. *Environmental Economics and Biodiversity Management in Developing Countries*. AMBIO Vol. XXII No. 2-3.
- McNeely, Jeffrey and Munasinghe. 1994. *Protected Area Economics and Policy: Linking Conservation and Sustainable Development*. World Bank and IUCN.
- NRMP Report No. 64. 1996. *Values of Preserving Forest Near Bukit Baka-Bukit Raya, Kalimantan*. Jakarta: NRMP.
- NRMP Report No. 62. 1996. *Economic Value of Fisheries to the Residents of Bunaken National Marine Park*. Jakarta: NRMP.
- NRMP Report No. 64. 1996. *Values of Preserving Forest near Bukit Baka-Bukit Raya, Kalimantan*. Jakarta: NRMP.
- NRMP Report No. 65. 1997. *Values of Preserving the Bunaken Coral Reef Ecosystem, North Sulawesi*. Jakarta: NRMP.
- Pearse, Peter. 1990. *Introduction to Forestry Economics*. University of British Columbia Press.
- Perace and Moran. 1994. *The Economic Value of Biodiversity*. IUCN and CSERGE.
- Ruitenbeek, HJ. 1992. *Mangrove Management: An Economic Analysis of Management Options with a Focus on Bintuni Bay, Irian Jaya*. Jakarta and Halifax: EMDI Environmental
- Sawyer, David. 1992. *Taka Bone Rate: Management, Development and Resource value*. University of Dalhousie: M.Ss. thesis
- Susmianto, Adi. 1995. *Recreational Expenditures in Gede-Pangrango National Park and their Regional Economic Impacts*. Michigan State University, USA: M.Sc thesis,
- Turner, Kerry and Davis Pearse. 1991. *Economics of Natural Resources and the Environment*. The Johns Hopkins University Press.
- Watson, R.T. and V.H Heywood. 1995. *Global Biodiversity Assessment*. Published for the United Nations Environment Programme.
- Winpenny, T.J. 1991. *Values for the Environment : A Guide to Economic Appraisal*. London: Overseas Development Institute.

APPENDIX A: Detailed Calculation on the Value of Natural Assests: Participatory Economic Valuation of Natural Resources in the Togeian Islands, Central Sulawesi ¹

a. Economic valuation of eco-tourism in the Togeian Islands

The study used direct expenditure technique to estimate the value of tourism based on the profit tourism industry operating in the Togeian islands. The following are data that were used to calculate the profitability of ecotourism operators:

Number of visitors	=	3500 annually
Average length of stay	=	7 days
Average expenditure	=	40.000 Rp/day
Total revenue	=	980 million Rp. per year
Profits as % of revenue	=	60%

The study also provides scenario with the following assumptions:

Low: No change in revenue

Medium: 10% increase every year

High: 20% increase every year, to a maximum of Rp.600,000/day/tourist, reached in year 15. High scenario too low because: (1) dive resorts on the Togeians are already charging US\$ 100 per day per tourist, and (2) the Togeians is increasingly being offered as part of up market tours to Manado and Bunaken NP.

Conclusion:

The high scenario in fact represents a considerable underestimate value, amounting to Rp 4,555 million with a 10% discount rate, over 25 years)

b. Economic value of traditional fisheries

To estimate the value of traditional fisheries, the study used market price-based technique using production approach as a component of reef value of the Togeians. The following are data used for the calculations.

¹ This study carried out by Jim Cannon entitled "Participatory Economic Valuation of Natureal Resources in the Togeian Islands". The report prepared for the U.S. Agency for International Development under the Indonesian natural Resources Management Program by EPIQ/NRM2.

(a) Total Catch Estimate

Variable	Estimate	Units
Population	29.347	people
Per capita consumption	0,5	kg/day/person
Total consumption	5.355	tons/year
Percentage exported	60	%
Total catch	13.400	tons/year

(b) Catch Rate

Variable	Estimate	Units
Number of fishers (full-time)	3.609	people
Fishing season	240	days/fisher/year
Total catch	13.400	tons/year
Catch Rate	15,5	kg/day

(c) High Value Scenario

Figure	Calculation	Result In (million Rupiah)
Total Revenue	= Total Catch x Average Price = 13,4 million (kg) x 2000 (Rp./kg)	26.800.
Total Cost	= Cost/fisher/day x Fishing season x Number of fishers = 6000 (Rp.) x 240 (days) x 3609 (fishers)	5.200
Profit (per year)	= Total Revenue - Total Cost = 26.800 million Rp. - 5.200 million Rp.	21.600
NPV	(over 25 years, 10% discount rates, constant profits)	196.000

(d) Low Value Scenario

Figure	Calculation	Result (in million Rupiah)
Total Revenue	= 50% lower than in High Value Scenario = e.g. 9.475.000 (kg) x 1414 (Rp./kg)	13.400
Total Cost	= 80% higher than in High Value Scenario (i.e. costs per fisher per day = 10.850 Rp.)	9.400
Profit (per year)	= Total Revenue - Total Cost = 13.400 million Rp. - 9.400 million Rp.	4.000
NPV	(over 25 years, 10% discount rates, constant profits)	36.310

Scenarios:

Low price/kg = 1000 Rp/kg

High price/kg = 4300 Rp/kg

Participatory input:

The number of days fished per year is 160, not 240.

Number of fishers is higher than 3609

Costs are less than 75% of revenue

Conclusion:

With a 10% NPV of over 25 years, net present value of traditional fisheries valued at Rp 196 billion and Rp. 36.3 billion for high and low scenario values respectively.

c. Profits of potential forest exploitation

One should note that there are no legal HPH operating in the islands. The estimates are based on the production figures from an old Togeian Islands concession held by PT Gobel from 1975 to 1995. Data on logging costs and prices are from DFID studies and a feasibility study for concession in Donggala, Central Sulawesi. The following data were used to estimate the revenue and profits of a potential logging operation in the Togeian:

Harvest volume	=	30 m ³ /ha
Annual area logged	=	750 ha/year
Price (before crismom)	=	750.000 Rp/m ³
Profit per m ³	=	25.000 Rp/ m ³

Scenarios

Low – zero profits

Medium – price recovers over 5 years

High – price recovers over 2 years

Conclusion

The following calculation used the high scenario

Figure	Calculation	Result (in million rupiah)
Profit / year ^a	= Area logged/year x Volume logged/ha x Profit/m ³ = 750 (ha) x 30 (m ³ /ha) x 25.000 (Rp./m ³)	563
NPV	(over 25 years, 10% discount rates, constant profits)	4.113

APPENDIX B: Some Resources Valuation Conducted in Indonesia 1992 - Present

Date	Location	Principal Investigator/ Sponsor	Methods	Results
1992	Taka Bone Rate National Park, South Sulawesi	Saywer/MS thesis	Production approach	NPV of fishery was Rp. 103,43 billion over 20 years with a 5% discount rate.
1992	Bintuni Bay, Irian Jaya	Jack Ruitenbeek/EMDI	Shadow prices, production approach,	Total economic values of all marketed and non-marketed local production are approximately Rp. 5.1 million and Rp 9 million annually per household.
1993	Mt. Gede Pangrango National Park, West Java	Darusman/Bogor Agricultural university	Watershed modeling – hydrological benefits	Rp. 280 million/hectare/year
1995	Mt. Gede Pangrango National Park, West Java	Adi Susmianto/ M.Sc thesis	Expenditure approach	The park affect thirteen economy sectors with total spending of Rp. 471 million of output or sales, Rp 80 million of income and 155 people employed.
1996	Bunaken National Park, North Sulawesi	Saunders/ NRMP/ USAID	Travel cost	Recreational value was Rp 9.8 billion per year
1996	Bunaken National Park, North Sulawesi	Saunders/ NRMP/USAID	Contingent valuation	Preservation value was about Rp 9.6 billion per year
1996	Bunaken National Park, North Sulawesi	Sounders/ NRMP/USAID	Production approach	The economic value of the fishery was US \$3.8 million annually for full time fishers and at least US \$330,000 for part time fishers.

1996	Bukit Baka Bukit Raya, Central and West Kalimantan	Saunders/NRMP/USAID	Contingent valuation	Preservation value was about Rp 10 billion annually
1996	Ciliwung river, Jakarta	Saunders/NRMP/USAID	Contingent valuation	Economic benefit of improving water quality in the Ciliwung river was about US \$30 million per year.
1997	Siberut and Ruteng Protected Areas	Kramer et al/ADB	Productivity, travel cost and contingent valuation	The willingness-to-pay for visitors' fee was \$23. The benefit of water protection was \$35 per household annually.
1998	Forest fire in Indonesia	WWF/EEPSEA	Productivity, health, benefit transfer, averted expenditure,	Economic loss was about US \$4.5 billion.
1998	Gunung Leuser National Park, North Sumatra and Aceh	Elfian/WWF and CIFOR	Productivity and expenditure approaches	Economic value of water that is in part derived from the park for irrigation, industry, and daily needs was about US \$34,3 million per year.
1999	The Togean Islands, Central Sulawesi	Cannon/NRM2/USAID	Production and expenditure approaches	With a 5% discount rate over 25 years, the NPV of ecotourism and forestry are Rp 5.3 billion and Rp. 4.1 billion. Economic value of traditional fisheries is between Rp 36.3 billion – Rp 196 billion.

APPENDIX C: The Results of Discussion with Directorate General of Nature Protection and Conservation of the Ministry of Forestry and Estate Crops concerning the Role of Resource Valuation in Protected Areas Management and Spatial Planning Process

- The officials hope that resource valuation can be used as an input to generate better policy recommendations to support protected areas management and its linkages to spatial planning process. Resource valuation studies should be conducted in the conflict areas (trade-off area) in order to get information on costs and benefits analysis useful for policy level work, both at local, provincial, and national levels.
- Park Managers should have knowledge of resource valuation in order to help provincial level policy-making process.
- Resource valuation is expected to be a ‘media’ to change vision of relevant stakeholders, including the government, in better understanding economic values of protected areas. It is hoped that it can help reduce conflicts among resource users.
- Conflict between economic development and conservation is increasingly occurring in the whole provinces of Indonesia threatening a number of protected areas at an alarming rate. Therefore, resource valuation should be “socialized” to a wide range of stakeholders in a simple, understandable and economic development language.
- It is recommended to develop participatory resource valuation in order to involve as many stakeholders as possible in the process, both working at provincial and national levels.
- Communicating the results of resource valuation work to a wide range of relevant stakeholders is a main point that needs to be addressed seriously.
- Resource valuation studies would be an important input to advocacy work.

Source: Informal Meeting on the Role of Resource Valuation in Protected Areas Management and Spatial Planning Process, July 29, 1998, Jakarta.